Fractal Harmonic Field Theory - Page 42

Mathematical Consistency of the delta^2 Motion Model

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1. Derivation of Velocity Relation

From special relativity:

(Delta t' / Delta t)^2 = 1 - v^2 / c^2

And definition:

delta^2 = 1 - (Delta t' / Delta t)^2

=> v^2 / c^2 = delta^2

=> v = c * sqrt(delta^2)

2. Formulation of the Entropy-Curvature Force

Analogous to conservative potentials:

f(delta^2) = kappa * grad(delta^2)

Modified acceleration law:

a_delta = d^2x/dt^2 + kappa * grad(delta^2)

Units: delta^2 (unitless), grad(delta^2) (1/length), kappa (m^2/s^2) to yield m/s^2.

3. Calibration to Earth Gravity

- Peak |grad(delta^2)| ~ 0.06 1/m with kappa = 1
- To match g = 9.8 m/s^2, set kappa ~ 9.8 / 0.06 ~ 163.33 m^2/s^2

4. Simulation Evidence

- Trajectory: Particle accelerates toward the high-delta^2 region and decelerates after passing through.
- Acceleration vs. Position: Symmetric peak of +/- 9.8 m/s^2 at the edges of the Gaussian delta^2 bump.

5. Conclusion

The delta^2-gradient force model is dimensionally correct, reproduces known acceleration scales, and behaves analogously to a gravitational well.